KAHN PRECIPITATION TEST FOR SYPHILIS*

AS USED IN CONJUNCTION WITH THE WASSERMANN TEST

By NEWTON EVANS, M. D.
Los Angeles

DISCUSSION *by Gertrude Moore, M. D., Oakland; W. T. Cummins, M. D., San Francisco; Zera E. Bolin, M. D., San Francisco.*

FOR the greater part of a year at the serological laboratory of the Los Angeles County General Hospital the Kahn test, in addition to the Wassermann test, has been used on all sera to be tested for syphilis. During this time (231 days) such parallel tests have been done on 17,694 sera. Of the entire number of specimens (17,694) the two tests were in complete agreement in 17,112 (or 96.71 per cent), while in addition 210 (1.18 per cent) other specimens were in relative agreement.

An absolute agreement means that both tests are either negative, or both doubtful (plus-minus or plus), or both positive (two plus, three plus, four plus) in reactions.

A relative agreement means that one test is doubtful and the other test either positive or negative.

Absolute disagreement means one test is positive and the other negative.

Thus, of the entire number approximately 97.9 per cent were in either complete or partial agreement, leaving 2.1 per cent of complete disagreements. These results, based upon nearly 18,000 specimens, are very similar to other published figures. In Doctor Kahn's "Serum Diagnosis of Syphilis by Precipitation" he presents results of comparative tests upon over 100,000 sera in his own laboratory, showing combined complete and relative agreement in more than 99 per cent. T. J. Hull reports tests upon over 25,000 specimens with a combined complete and relative agreement of 97.8 per cent to which our results (97.9 per cent) are very similar.

It is evident that in laboratories where large numbers of such tests are made the results of the Kahn method closely parallel those of the Wassermann test.

OUR EXPERIENCE

For some months preceding our experiments with the Kahn method the laboratory was using the Kolmer system of the Wassermann test in which a preliminary qualitative test was made upon all specimens, followed by a Kolmer quantitative upon all cases in which the preliminary qualitative test was positive or doubtful. After several thousands of parallel tests were made and it became evident that the Kahn test could be relied upon as a routine method, we abandoned the plan of making Kolmer quantitative upon all positive or doubtful sera as evidenced by the preliminary qualitative Wassermann test, and applied the quantitative method only in those specimens where a disagreement appeared between the qualitative Wassermann and the Kahn test. This is our present plan and appears to us to be an entirely practical and satisfactory routine method of making serological tests for syphilis under the conditions existing in our hospital, where about one hundred specimens of sera come to the laboratory daily.

We think the present plan of making routine parallel tests, Wassermann and Kahn, has definite advantages over other methods, such as running the regular Wassermann with two antigens, or the method which was formerly used in our laboratory as described above, namely, the Kolmer qualitative followed by the Kolmer quantitative, or the plan of substituting entirely Kahn tests for the Wassermann method, which it is said is being done in some hospitals and notably in the United States Navy on ships away from their bases.

ADVANTAGES OF KAHN TEST

1. It is less time-consuming. Quicker results and reports can be secured and it is more economical for this reason.

2. It is much simpler, as one reagent only—the antigen—is required, in contrast to the several ingredients of the classical Wassermann. No animals are necessary to supply the fresh complement.

3. Reports of those using the Kahn method indicate that it is a somewhat more delicate indicator of the presence of syphilis than the Wassermann test. A higher proportion of treated cases and others not reacting positively to the Wassermann for reasons unknown do react positively to the Kahn test. Our experience confirms this opinion. In the 372 sera in our series where there was definite disagreement between the two tests, 229 were Kahn positive and Wassermann negative while only 143 were Wassermann positive and Kahn negative. In thirty cases where the clinical histories and findings indicated the presence of syphilis, twenty-one cases had positive Kahns and negative Wassermanns, while only nine had positive Wassermanns with negative Kahns.

4. An advantage of decided importance is the fact that in the great majority of sera which for any reason prove "anticomplementary" in the Wassermann test (manifesting an ability to bind or deviate the complement even in the absence of the antigen), making the reading of the test impossible in the ordinary titrations, the Kahn test is not interfered with and will give satisfactory information as to the presence or absence of syphilis. In our series from one-half to one per cent of the specimens proved to be anticomplementary, and in all of these satisfactory readings were secured without trouble by the Kahn test. The records of forty-two cases of this kind indicate that four were negative with the Kahn test and thirty-eight were positive. Thus, if we had been limited to the Wassermann method there would have been thirty-eight positive cases where we must have reported that no results could be secured because the specimens were anticomplementary. (There are methods of securing results on some of these sera by using high dilutions of

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the serum and appropriate quantities of the reagents, but these are extremely complex and time-consuming, and are not ordinarily used.)

DISADVANTAGES OF THE KAHN METHOD

1. It is not practical for tests of cerebrospinal fluid; at least we have found this to be the case in our experience. These specimens are tested by the Wassermann method.

2. It requires more experience and judgment to read the results of the Kahn reaction than to recognize the varying degrees of hemolysis in the regular Wassermann tests, and long training is essential on the part of a technician if the results are to be depended upon; consequently, it is not applicable to office work unless done by one who has had long experience in the method. On the other hand, it is possible that some of the modifications in which the test is made on a microscope slide and read with the microscope may be more dependable in the hands of persons without great experience.

3. In our experience the Kahn test is liable to be "temperamental" and the mixtures to vary in degrees of general cloudiness from day to day, so that if the parallel Wassermann tests were not available for comparisons one might be in perplexity as to the dependability of his tests. We have also found that the preparation of a satisfactory antigen is a more difficult and delicate process than it is to secure a satisfactory Wassermann antigen.

ADVANTAGES OF COMBINED METHOD

1. In our opinion it is preferable to use both tests in conjunction, especially in laboratories where many specimens are examined, for there is a small proportion of cases with wide disagreement (negative in one test and four plus in the other) in which the conflicting results are of value, for it is undoubtedly true that "false negatives" in properly checked tests, either Wassermann or Kahn, are much more frequent than "false positives," and therefore it is important to have the advantage of the knowledge presented by the "positives" from either method.

2. When the two systems are used side by side each serves as a check upon the other, and quickly makes evident any technical error or defective reagents.

3. Another advantage of making parallel tests is in learning to read the Kahn test. The beginner tends to strain his eyes and his imagination to see fine precipitates which are not there, and by reading them as suspicious (plus-minus) and checking against the Wassermann results which are evidently negative, he will realize he is attempting to read the precipitation test too closely.

In conclusion, our experience with the Kahn precipitation test leads us to regard it as a distinct addition to available and practically useful laboratory methods, and we believe it is particularly effective when used in conjunction with the Wassermann tests in laboratories where large numbers of specimens must be examined.

It gives me pleasure to acknowledge the faithful labor, the helpful suggestions and the enthusiastic coöperation of Bertha Ogburn and Muriel Chesnut, without which the preparation of this paper would have been impossible.

Los Angeles County General Hospital.

DISCUSSION

GERTRUDE MOORE, M. D. (2404 Broadway, Oakland). Doctor Evans' paper emphasizes the importance of the use of both the Kolmer complement fixation and the Kahn precipitant test in the study of syphilis. Our experiences check those of most workers, regarding the percentage of tests which agree. The Kahn reaction is inferior to the Kolmer in standpoint of specificity, and superior in that it gives positive readings earlier in the disease and longer after vigorous treatment. The Kahn reaction is of particular value in determining the point at which treatment should be stopped in old cases of syphilis. We are convinced that both tests should be used in all cases, but if this is impossible and one must be selected, there is no question but that the Kolmer reaction is more reliable and, therefore, the test of choice.

W. T. CUMMINS, M. D. (Southern Pacific General Hospital, San Francisco).—Any test for syphilis that may be used in conjunction with the Wassermann technique deserves consideration on account of the unmerited criticism which has been passed upon the Wassermann technique by reason of widely different reports from different laboratories. Numerous techniques have been offered and none appears to have survived substantially but the Kahn test. Many reports, which include the parallel examination of a large number of blood sera with both techniques, attest to the value of the Kahn. Doctor Evans has studied a very worthwhile number of sera. His report, confirming the work of Kahn and others, shows a very high percentage of agreement of the two techniques. There are well-recognized difficulties with and disadvantages of the Kahn test. The difficulties with cerebrospinal fluid later may be cleared away. Unquestionably the advantages materially outweigh the disadvantages of the test, and it stands today as a valuable means of examination for syphilis.

The discusser heartily agrees with Doctor Evans that the Kahn test is particularly effective when used in conjunction with the Wassermann. In my opinion, as implied also by Doctor Evans, the Kahn test should not be used alone.

ZERA E. BOLIN, M. D. (University of California Medical School, San Francisco).—The paper by Doctor Evans is in accord with the testimony of practically everyone who has run a large series of comparative tests using the Kahn and one of the modifications of the complement-fixation tests. The Kahn test is based upon the reaction of the "reagin" in the luetic serum with a very sensitive antigen. Positive reactions are shown by a precipitation of the colloids in suspension in the antigen.

Having had considerable experience with precipitation tests for syphilis, including the Sachs-Georgi, the Meinecke and its modifications, and the Kahn test, I feel that a precipitation test should never be used alone as a diagnostic procedure.

The ease of manipulation of the Kahn test lays it open to use by unskilled workers who do not understand the underlying principles. The antigen is hard to prepare. It is hard to dilute so as to get the same colloidal suspension upon which, in all probability, its sensitiveness depends. The precipitate is hard to read accurately, and the strength of the reaction depends upon the judgment of the person reading the test. It is most emphatically not a procedure which can be turned over to the office nurse. The specificity of this precipitation has yet to be checked in a large series of entirely negative sera. The conditions causing the precipitation of the colloidal suspension may be in-

voked by changes in the serum caused by other diseases.

In my opinion this test must be always substantiated by comparison with a sensitive Wassermann technique, and the best of these, as yet, seems to be Kolmer modification of the complement-fixation test.

SCABIES AND ITS COMPLICATIONS*

By THOMAS J. CLARK, M. D.
AND
FRANK H. STIBBENS, M. D.
Oakland

DISCUSSION *by George D. Culver, M. D., San Francisco; Robert T. Legge, M.D., Berkeley; C. Ray Lounsberry, M.D., San Diego.*

THE problem of the medical adviser is very often made difficult by the absence of any exact etiological data upon which to base a diagnosis, and aid judgment in formulating proper procedure for the care of his patient. But in scabies the etiology is known and the fog of uncertainty is entirely dispelled if proper caution is used in arriving at the diagnosis. The cure is attained by selection from a very few efficient remedies and by use of the same in the proper strength and mode of application.

Scabies is not a difficult dermatological question, but it is one that should be given careful treatment by the attendant doctor so that a very annoying condition may be properly and completely cured.

Cause.—The disease is caused by a minute animal parasite that lodges in the skin. This parasite is a spider. Human scabies is produced by a species known as *Sarcoptes scabeii hominis.* This variety has become adapted to human habitation and is readily passed on from one infested person to another. The substrata of society constitute the reservoir of hosts for the unending reproduction of the parasites. Mites allied to human acari are parasitic to horses, cows, goats, dogs, cats, chickens, and many other animals. These have made man a temporary host, but they do not become permanently entrenched as are the sarcoptes hominis.

Mites are found in every part of the world. Many are parasitic, but there are also varieties that exist on decaying matter both vegetable and animal. In museums they are troublesome to the specimens which must be protected from these destroyers that would literally eat them up.

From animal to man the transfer occurs most frequently by the variety that causes horse scabies.

After possessing its host the female parasite proceeds to burrow into the epidermis to a sufficient depth to secure its nourishment. The male enters the burrow for sexual mating after which it retires to the surface to seek out other females, or it burrows an offshoot for itself and dies in a few days, its life cycle from ovum through the moulting periods and adult sexual life lasting about one month. The female remains in its burrow and, after impregnation deposits eggs in the channel of the burrow at the rate of one or two each day, for a period of two or three months, then dies. The ova develop rapidly, the young mites appearing in from three to six days. At first there is a larva stage, the number of legs and bristles being less than for the adult. The body surface is then shed. More legs and bristles appear, and after the second moulting the now mature mite is ready for the reproductive stage. About one month in time is occupied from ovum to reproduction period, but it has been calculated that one female may have before her death several hundred thousand progeny. Thus the human Gulliver has plenty of Lilliputians to attack him.

The cause of the skin reactions in scabies is the wounding of the skin tissues by the burrowing of the acarus into the epidermal layers. This hominis variety of the parasite is not a surface organism, but undermines the horny stratified cell layers so that it may reach the lower portions of the epidermis. Here it has an abundant food supply, is secure from danger, and may deposit its ova for perpetuation. The burrow is, therefore, its home, its defensive quarters, its nursery, and its tomb.

Symptoms.—The outstanding subjective symptom of scabies is itching. So characteristic is this symptom that "the itch" remains the common name for the disease. It will vary in degree from an intolerable condition in sensitive individuals to but a passing inconvenience in the phlegmatic. There is loss of sleep from bed-warmth itching. If pyogenic inflammatory reactions occur to any extent, especially in children, there may be much tenderness and pain in the hands and feet, the buttocks, and the flexures.

The eruption is found quite generally over the body surface as a discrete vesicopustulation or papulation. The sites of preference are at the opposed surfaces of the fingers and finger webs, the wrists, ulna border, the axillary folds, the nipples and areolae, the buttocks and genitals. Uncomplicated lesions are small, like mustard seed. They are not confluent unless modified by eczema or pyogenic infection. Lesions in cases where treatment is not started promptly become larger and, as the parasites multiply, the skin becomes thickened and pustular. Such a patient presents a sorry-looking appearance. Scabies associated with diseases that modify the sensibility of the skin, as in paralytics or in leprosy, may become very extensive with thickened masses of crusts and offensive oozing.

Complications.—The complications of the disease are due to pyogenic organisms developing in the skin with the various phases of inflammation which they produce. Infection is the more readily brought about by the burrow destroying the defensive qualities of the cornified epithelium.

Furuncles, impetigos, adenitis, and phlegmons are produced.

Impetigos are frequent in children. The child becomes a mass of pustular sores and thick crusts that involve the scalp and face as well as the rest of the body. The original infection by scabies in these cases may be overlooked. The child may be

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